



App Store Commission Rates and the Value of Apple and the App Store to Developers

Detailed Presentation

January 2024

Highly Confidential - Attorneys' Eyes Only

App Store pricing background

- **How do developers use in-app purchases (“IAP”)?**
 - Gaming bonuses or “pay-to-win” features (e.g., Clash of Clans)
 - Dating app purchases for additional features (e.g., boosts on Tinder)
 - Subscriptions to multiplatform video streaming apps (e.g., Hulu), education apps (e.g., Duolingo), news and magazine apps (e.g., NY Times), and for companion apps to connected devices (e.g., Ring)
- **Apple commission on IAP**
 - **30% headline commission** (15% for some programs and subscriptions after first year)
 - Currently developers **cannot direct customers** to payment methods outside of the App Store
 - **No fees** are charged for digital goods and services (“DGS”) sold outside the App Store

***Epic* injunction and goals of this study**

- **A post-Epic injunction world**

- *Epic Games v. Apple* injunction requires Apple to allow some type of linking out of the app to purchase DGS
- If a developer links out and does not use Apple's payment system and related benefits, it still derives substantial value from the services provided by the Apple ecosystem
- How can Apple fairly charge for that value? What is the value of Apple and the App Store to developers? What pricing could make linking out an actual option for developers (to comply with injunction)?

- **Goals of this study:**

- Estimate the value of services provided by the Apple ecosystem to developers, focusing on DGS (**Part 1**)
- Compare Apple's commission with those of other app stores and digital marketplaces (**Part 2**)
- Provide an economic framework for considering alternative pricing options (**Part 3**)

Part 1. Valuing the services provided by the Apple ecosystem to developers

The value of the Apple ecosystem to developers

Apple and the App Store provide several categories (or “buckets”) of value to developers

1. Platform technology

Access to core Apple technologies, intellectual property, and a platform that integrates hardware and software

2. Developer tools and services

Tools and services to help developers build apps and optimize their performance, engagement, and monetization

3. Distribution

Hosting and distributing apps and updates to global users at a large scale;
Fostering user trust in the App Store and its apps, preventing piracy, and protecting developers

4. Discovery

Services including some advertising and marketing to acquire users and measure channel performance

5. Care and support

Developer and customer care capabilities provided across all tools and services, including Apple experts and technical support

IAP-related buckets



6. Payments

Basic acceptance of payments from users

7. Commerce

Capabilities that allow developers to grow and manage their sales

Different developers derive different value from the Apple ecosystem

- The value of the Apple ecosystem to a particular developer depends on the types of apps they are developing; not all developers rely on the same value buckets in the same way
- **Different reliance on platform tech but overall better experience for users; examples:**
 - Games rely more heavily on hardware and operating system software (web-based apps must host games and store information on the cloud)
 - Video and music streaming apps allow users to download content for offline use (web-based apps often don't allow this due to piracy risks outside of apps)
- **Different reliance on developer tools and services**
 - Metal SDKs to take advantage of Apple's processors for gaming and pro apps
 - HealthKit SDK to access user data for health and fitness apps
- **Different considerations for large versus small developers**
 - Trust may be more relevant for small developers
 - Small developers may rely more on other buckets of value (for example, distribution and discovery)
 - Large developers tend to use developer tools and services more often than small developers

Valuation: Summary of findings

- **Goal of analysis:** Estimate the value of services provided by the Apple ecosystem to developers, focusing on DGS
- **Approach:** Estimate the **costs to developers** to hypothetically procure (if only in part) services Apple otherwise provides

Results:

Value bucket	% of developer revenue
Platform technology	30% (5%–20% platform tech only; 0.3%–6% with no demand generation)
Developer tools and services	3%–16% (0.1%–5% for game engines)
Distribution*	4%–14% (4%–25% including small game developers)
Discovery	5%–14% (5%–21% including small game developers)
Care and support**	not estimated

Caveats:

- The stack of services Apple provides is unique; this analysis is an effort to approximate the value of those services
- Possible overlap in value buckets and buckets are not necessarily additive (a developer does not necessarily use all features)
- %'s based on revenues generated by IAP; even for apps with IAP, there can be revenue sources outside the App Store
- Alternatives typically involve upfront costs, which would make it harder to start apps and financially riskier for developers

* Distribution percentage of developer revenue is estimated using distribution costs of deployment.

** We exclude Apple care and support, as this value bucket is unique to the Apple platform and difficult to replicate and value.

Further details: Platform technology

Platform technology

1. A **high-quality common infrastructure** for consumers and developers
 - Brings users and developers together
 - Engages both sides and keeps them on the platform
 - Provides a secure and trusted environment (e.g., FaceID)
2. A technological core to **expand third-party developer capabilities**
 - Third-party apps build on technological core of basic functionalities
 - Improves quality and enables capabilities of third-party apps (e.g., through camera integration, Core Location, Core ML, and Apple SDKs)

	Apple platform technology	
Common infrastructure	<ul style="list-style-type: none"> • Operating system • Frameworks 	<ul style="list-style-type: none"> • Innovative technologies • Developer protections
Capability expansion	<ul style="list-style-type: none"> • Frameworks 	<ul style="list-style-type: none"> • Entitlements & capabilities • Innovative technologies

- While it is not possible to directly value these components, we adopt an indirect approach to valuing Apple platform technology through (1) benchmarking of comparables and (2) analyzing the cost of alternatives (that do not replicate all of Apple's capabilities) for developers

Platform technology: Comparables benchmarking

- One way to benchmark the value of Apple's platform technology is to consider the prices that comparable platforms charge sellers (*the following results are based on our previous work*)
- **Pricing:** comparable platforms charge more if they provide platform technology
 - Games consoles: **30%** of revenues (includes other buckets than platform technology)
 - E-commerce business services: **0.3%–6%** of revenues (platform tech only, with no or limited demand generation)
 - Physical retail: **5%–20%** of revenues (platform tech only, with demand generation)
- Platforms that provide more value and platform technology (e.g., Google Play Store) charge more than those that provide only limited platform technology (e.g., Patreon)

	Functionality	Examples	% of revenues
Games consoles	Games marketplaces with platform technology	<ul style="list-style-type: none"> • Xbox Store • PlayStation Store 	<ul style="list-style-type: none"> • 30% (total price, includes other buckets than platform technology)
E-commerce business services	Provide technological tools for capability expansion but have no demand generation aspect	<ul style="list-style-type: none"> • Shopify • Adobe Commerce 	<ul style="list-style-type: none"> • 0.6%–2.6% • 0.3%–6%
Physical retail	Offer space for stores and customers, along with ancillary services (e.g., bathrooms)	• Shopping malls	• 5%–20% ("percent leases")
		• Airports	• 8%–18% (plus minimum annual guarantee)

Notes:

[1] Physical retail pricing varies across and within retailers. At airports, higher-revenue businesses typically pay higher marginal commission rates.

[2] E-commerce business services platforms charge fees on revenues gross of costs, while digital goods and services sold on the App Store typically have very low marginal costs.

Platform technology: Potential alternatives

- Developers can either use Apple platform technology to run apps or they could incur costs to hypothetically procure parts of its functionality
 - This would provide a **lower bound** on the value provided by Apple's platform technology because substitutes do not replicate all capabilities of the Apple platform

1. Cloud services

- Allow developers to run webapps, store data, and use remote graphics, frameworks, and computing resources (rather than running apps on Apple hardware and using iCloud or saving on device)
- **Examples:** AWS, Azure, Google Cloud
- **Pricing model:** Priced per hour of usage; tiered by virtual compute resources used

2. API libraries

- Allow developers to integrate digital products with third-party services, facilitating interactions between groups, creating digital infrastructure and expanding capabilities
- **Examples:** Plaid (similar to Apple metrics and ID integration), Terra (similar to HealthKit and its entitlement), Twilio Segment (similar to Apple ID integration)
- **Pricing model:** API libraries charge a monthly or per-authentication fee

Further details: Developer tools and services

Developer tools and services

- Technical tools and services allow developers to build apps and optimize their performance, engagement, and monetization

- Integrated development environments (IDEs)
- Programming languages
- Developer programs
- Developer analytics
- Frameworks
- Innovative technologies
- Testing tools
- Developer protections

- Apple provides these tools free to developers
 - A key benefit of current Apple model for developers is that it **lowers startup costs and risks**, compared to a world in which they would need to pay up front for tools and services
- Alternatively, these tools are available through third parties, typically for a flat fee per developer seat, subscription, or usage-based fee
 - Tiered pricing structures, as well as negotiated (and opaque) pricing structures are common

Developer tools and services: Potential alternatives

- We consider potential alternatives (and illustrative pricing) for each category of DT&S; pricing varies by **product type** and **developer size**

DT&S category	Apple services	Potential alternative services	Illustrative price of alternatives
Integrated development environments (IDEs)	Xcode, Swift	AppCode, Microsoft Visual Studio, Gluon	<i>Per developer-seat per year:</i> <ul style="list-style-type: none"> SMB: \$200–\$1,300 Enterprise: \$200–\$3,000
Programming languages	Swift	Java, Elements, C++ front end by Edison Design Group	<i>Per developer-seat per year:</i> <ul style="list-style-type: none"> Base: \$800 Enterprise: \$1,500–\$15,000
Developer programs	Apple Developer Program	Google Play Developer Account, Amazon Appstore Development Account	<i>One-time fee per developer:</i> \$0–\$25
Developer analytics	App Analytics, Data export	Data.ai, Qonversion, Google Firebase, Amplitude Analytics	<i>Fixed fee per month:</i> <ul style="list-style-type: none"> SMB: \$300–\$2,000 Enterprise: \$3,000+
Frameworks	CloudKit, MapKit, GameKit	Google Maps platform, Bing, Plaid, Unity multiplayer services	<i>Pay-as-you-go</i>
Innovative technologies	ARKit, Push Notifications, Fairplay	Unreal Engine, Azure Notifications, PlayReady	<i>Pay-as-you-go and commission</i>
Testing tools	Xcode simulator, TestFlight	Appetize, Kobiton, Perfecto, TestFairy	<i>Fixed fee per month:</i> <ul style="list-style-type: none"> SMB: \$40–\$400 Enterprise: \$2,000–\$3,000
Developer protections	Fairplay, DeviceCheck, App Attest	Android DRM, SafetyNet APIs	<i>Free (provided by Google)</i>
Dev. education & support	WWDC, iOS Developer University	Microsoft Build, Google I/O	<i>Fee per participant:</i> \$1,150–\$2,395

Developer tools and services: Pricing estimate

- **DT&S pricing:** between **3%** and **16%** of developer revenues
 - Because of fixed costs, DT&S costs are a larger percentage of revenues for small developers

	Small developer	Large developer
	Average developer App Store billings	
Games		
Non-games		

	Typical DT&S usage
Basic/common tools <i>e.g., Xcode, Swift, Push Notifications</i>	
Advanced/specialized features <i>e.g., ARKit, CoreML, HealthKit, CloudKit</i>	
Testing and analytics <i>e.g., TestFlight, App Analytics</i>	

	Approx. average DT&S cost (% revenues)	
Games	11%	5%
Non-Games	16%	3%

Notes: Revenue estimates are based on 2022 App Store data. “Small developers” are assumed to have between \$10,000 and \$1 million in revenue and fewer than 1 million downloads. “Large developers” are assumed to have over \$1 million in revenue or over 1 million downloads. Cost estimates are based on price ranges of comparable tools in each DT&S category.

Developer tools and services example: Game engines

- Game engines are **software frameworks** for creating games (i.e., tools for rendering, physics, level creation, animation, etc.)
- Examples:** Unity, Unreal Engine (Epic)
 - Unreal Engine and Unity together accounted for 58% of game engines on Steam in March 2022, with in-house engines being the only other category with over 5%
- Pricing:** Game engines cost between **0.1%** and **5%** of developer revenues

Game engine	Pricing model	Illustrative cost		
		Small developer	Large developer	% revenue
Unreal Engine	5% royalty on annual revenues above \$1m (0% otherwise)	\$0	\$1.6m	0%–4.8%
Unity	<i>Price per developer-seat per year:</i> <ul style="list-style-type: none"> SMB: \$399 Pro: \$2,040 Enterprise: Negotiated 	\$2,000	\$40,800	0.1%–1%

Notes: Revenue estimates are based on 2022 App Store data. “Small developers” are assumed to have between \$10,000 and \$1 million in revenue and fewer than 1 million downloads. “Large developers” are assumed to have over \$1 million in revenue or over 1 million downloads. Illustrative cost based on average large game developer App Store revenue of [REDACTED]. Steam statistics count each game equally.

Further details: Distribution

Distribution: Seamless distribution at a global scale

- **1.5 billion** Apple devices across **175 regions**, **40 languages**
- **Over** [REDACTED] of downloads come from **outside** developers' home countries
- [REDACTED] weekly app **downloads**, [REDACTED] **redownloads**
- [REDACTED] weekly app **updates**, **99%** of which are **automatic**
- [REDACTED] of data transferred in 2022 for small and large developers
 - Equates to an estimated [REDACTED] in annual AWS CloudFront data transfer costs

	Downloads per developer (2022)	Redownloads per developer (2022)	Updates per developer (2022)
Small developers	[REDACTED]		
Large developers			

Notes:

[1] Downloads from App Store 2022 downloads data, limited to apps with in-app revenue in 2022.

[2] "Small developers" are developers with fewer than 1 million downloads and fewer than \$1 million in total revenues in 2022. "Large developers" are developers with at least \$1 million in revenues or one million downloads in 2022. Excludes "casual developers" – developers with less than \$10,000 in revenues in 2022.

[3] Redownloads are estimated using overall ratio of weekly downloads to redownloads (1:2).

[4] Updates are estimated using the overall ratio of downloads to updates.

Benefits of App Store distribution capabilities

1. Dynamic access to hosting infrastructure

- Centralized mechanisms for update notification and deployment
- Structured for global audience (localization)
- Ability to handle high download volumes (unlimited bandwidth, content delivery network)
- Quick and reliable delivery, seamless restoration on new devices
- Off-premise storage for app content (On-Demand Resources)

2. Automatic updates

- Improved user experience (less attrition, enhanced app monetization)
 - No delay or hassle for users, minimized risk of service interruption, timely roll out of new features
- Reduced support costs (less downtime)

3. Secure systems

- Prompt distribution of patches, bug fixes
- Source code and data protection (e.g., encryption, sandboxing, app thinning, code signing)
- Review process (catches and resolves security vulnerabilities before distribution)
- User verification and authentication

Distribution: Potential alternatives

- **Cloud service providers (Azure, AWS, GCP, Aliyun)**
 - Offer comprehensive suite of cloud services, including data transfer and storage capabilities, content delivery networks (CDNs), as well as related security features
- **Web infrastructure providers (Cloudflare, GoDaddy)**
 - Offer services to provide the back-end platform for users to access and download apps to their devices, including content delivery networks (CDNs), as well as related security features
- **Cost components**
 - **Data hosting** of app bundles, binaries
 - **Data storage** of on-demand resources
 - Enables faster downloads, smaller app binaries, richer app content
 - **Data transfer** of downloads and updates, which varies by app size
 - Larger size: apps with more on-device app content (e.g., graphics, sounds, animations)
 - Smaller size: apps with streaming capabilities, minimal on-device app content
- **Limitations**
 - Significant upfront costs to developers
 - Pricing structure based on usage, not sales (financially riskier for developers)
 - Deployment of new features may require more downtime, lost revenue
 - Developers responsible for managing own infrastructure, including security measures

Distribution: Estimated costs of deployment

- **Data transfer** costs between **4%** and **14%** of developer revenues
 - Including small game developers, revenue percentage cost is approximately **4%–25%**
 - This is a lower bound that does not include the significant value of users' trust in the App Store's privacy (e.g., App Review, which increases downloads) and piracy protection measures (which protect developers)

	Small developer		Large developer	
	Non-Games	Games	Non-Games	Games
Annual developer revenue				
Annual downloads, redownloads, and updates per developer				
App size				
Estimated cost per GB	\$0.08		\$0.05	
Annual costs				
Total (% revenue)	13.5%	24.7%	3.9%	3.8%

Notes and assumptions:

[1] Annual revenue, downloads, redownloads, and updates reflect the average for developers with in-app revenue in 2022.

[2] App size for non-games: the median size of the highest-ranking social networking apps [REDACTED]. App size for games: the median size of the highest-ranking gaming apps [REDACTED]. App size for small developers is assumed to be 25% smaller. App size reduced by 30% in calculations to account for file compression.

[3] Updates are assumed to be two-thirds the size of downloads and redownloads.

[4] Annual costs are average costs for developers with in-app revenue in 2022 based on transfer volume, price per GB, and app size. Cost per GB is discounted for large developers to account for typical volume discounts.

[5] Small developers assumed to have more than \$10 thousand and fewer than \$1 million in annual revenues and fewer than 1 million downloads. Large developers are assumed to have over \$1 million in annual revenues or over 1 million downloads.

Distribution: Estimated costs of hosting

- Data hosting and related security costs between [REDACTED] of developer revenues

		Small developer	Large developer
Annual revenue		[REDACTED]	
Example			
Annual web domain registration/renewal cost	Cloudflare	\$8–\$11	
	GoDaddy	\$10–\$50	
Annual web hosting cost	Cloudflare	\$2.4k	\$12k
	GoDaddy	\$84–\$260	
Web backup	GoDaddy	Included in hosting cost	
Web security (with CDN)	Cloudflare	Included in hosting cost	
	GoDaddy	\$180–\$240	
Total annual costs		\$300	\$12k
Total (% revenue)		[REDACTED]	

Notes:

[1] Annual revenue reflects average revenue for developers with in-app revenue in 2022.

[2] Annual cost estimates range between the lower end for small developers and the upper end for large developers.

[3] Small developers assumed to have more than \$10 thousand and fewer than \$1 million in annual revenues and fewer than 1 million downloads. Large developers are assumed to have over \$1 million in annual revenues or over 1 million downloads.

Users' trust in the App Store

- Through App Review, ATT, nutritional labels, etc., **Apple protects users** by keeping malware, cybercriminals, and scammers out of the App Store and **protects users' privacy** by providing increased transparency so that users can make informed decisions regarding their private information
- Users are likely to **trust more apps from a safe and closed ecosystem** such as the App Store than from an open-source environment
- By downloading from the App Store, users can trust that the app:
 - Does not contain viruses,
 - Is not a scam, and
 - Will not violate privacy
- This is particularly relevant for **small or new developers** and for more **sensitive apps** such as children, health, and business-related apps
- Developers may need to find other reputable distribution sources, or certification, which could be costly

Limiting the cost of piracy and misuse of brands

- Pirated apps are widespread causing **developers to lose out on the app's revenue**
 - In 2017 **~15-20%** of app downloads from third-party stores were pirated (Forbes estimate)
 - Several game developers have reported that **90%** of their app installations on Android devices are pirated versions that give them no revenues
 - In other cases, monetization tools, such as in-app purchases or advertising, are removed or replaced
- Pirated apps may also increase developers' costs
- Nefarious apps often pose as legitimate apps (e.g., Netflix) to be downloaded, potentially harming their image

Further details: Discovery

Discovery

- **650+** million visitors to the App Store per week on average
- The App Store helps developers showcase their products and acquire users
 - **130,000 apps** featured on the App Store and Apple channels

	Resources
Product pages	Standardized and customizable product pages <ul style="list-style-type: none"> • Include description of in-app events, advertising of in-app purchases • Localization (custom Pages by Region) • Ratings and reviews • Customization to target different audiences • Statistical testing of feature changes on performance metrics
Curation and personalization	Apple editors drive traffic across all Apple platforms to product pages <ul style="list-style-type: none"> • Now Available (Pre-Order), App of the Day, Featured Apps, Curated Lists, Apple Awards
Optimization and data analytics	Understand customer needs and drive business decisions <ul style="list-style-type: none"> • Dashboard with performance metrics
Platform and iOS discovery	The Apple platform helps users find apps <ul style="list-style-type: none"> • Web app icon in SpringBoard • App Library (for reengagement) • Spotlight search

Discovery: Comparable alternatives

	Cost comparable	Cost of selected alternatives
Product pages	<ul style="list-style-type: none"> Web design, development and management Implementation of review system 	Product page <ul style="list-style-type: none"> Templates (<i>one time fee</i>) Full-stack web developer and designer (<i>one time fee, incremental fees for changes</i>) Review system <ul style="list-style-type: none"> Trustpilot (<i>starts at \$250/month</i>)
Curation and personalization	<ul style="list-style-type: none"> Data storage Data analytics platform Reporting tool 	<ul style="list-style-type: none"> Google Analytics (<i>free</i>) Kissmetrics (<i>starts at \$299/month</i>) Optimizely (<i>price on asking</i>)
Optimization and data analytics	<ul style="list-style-type: none"> Data storage Experiment (A/B) testing platform Reporting tools 	<ul style="list-style-type: none"> Google Optimize (<i>starts at \$0/month</i>) Optimizely (<i>price on asking</i>) VWO (<i>starts at \$0/month for <50,000 visitors</i>) Zoho (<i>starts at \$30/month for < 10,000 visitors</i>) Unbounce (<i>starts at \$145/month</i>)
Platform and iOS discovery	<ul style="list-style-type: none"> Increase in advertising Alternative database of apps 	Advertising <ul style="list-style-type: none"> Google/Facebook (<i>pay as you go, \$3.60 per conversion on average globally</i>) ProductHunt (<i>free, one-time fee marketing agency</i>) AlternativeTo (<i>free, crowdsourcing</i>)

Discovery: Cost estimation

- Advertising cost comprises the majority of the discovery cost and is estimated as downloads originated in the browse channel from the App Store times the advertising cost per download
- Costs per developer are approximately **5%** to **14%** of developer revenues
 - Including small game developers, range is approximately 5% to 21%

	Small business		Large business	
	Games	Non-games	Games	Non-games
Average annual revenue				
Average downloads per developer				
Downloads from App Store browse				
Advertising cost per download				
Advertising cost (% revenue)				
Non-advertising cost (% revenue)				
Total discovery cost (% revenue)	21.4%	13.7%	7.5%	4.8%

Notes:

[1] Average annual revenue and downloads only for developers with IAP revenue in 2022.

[2] "Small businesses" are developers with fewer than 1 million downloads and fewer than \$1m in earnings in 2022, who have consistently had more than 1,000 annual downloads. "Large businesses" are developers with at least \$1 million in earnings or 1 million downloads in 2022.

[3] Advertising costs estimated using alternative advertising tools. Non-advertising costs estimated by adding the costs of alternative tools for product pages, curation and personalization, and optimization and data analytics. See Appendix slides for details.

[4] Downloads from App Store browse is calculated as the weighted average across app categories of the ratio between the number of downloads in 2022 originated from the Today, Games, and Apps tabs of the App Store (the browse channel) and the downloads originated from the browse, referrals, and search channels. App categories are weighted by the number of downloads originated from the browse channel.

[5] Advertising cost per download is equal to the minimum between Annual revenue per download and the Cost per Install (CPI).

[6] Cost per install is the effective price the developer pays each time a user installs their app as a result of an ad campaign. CPI is estimated as total ad campaign spend divided by the number of new (tracked) app installs from ad campaign. CPI is assumed to be equal to \$3.60 for Non-Games and \$4.30 for Games. Source: "Cost Per Install (CPI) Rates (2023)," Business of Apps, www.businessofapps.com/ads/cpi/research/cost-per-install.

Part 2. Benchmarking

Benchmarking: Summary

- While no other platform offers the set of unique tools and services that the App Store does, the App Store **headline commission is in the range** of other integrated app stores and games marketplaces (which command a premium) and digital marketplaces
 - ~**30%** for certain integrated app stores (Google Play Store, Amazon App Store)
 - **30%** for game marketplaces with platform technology (Xbox, PlayStation, Nintendo)
 - **20%–30%** for Steam, a game marketplace with no platform technology
 - **15%–25%** for software add-on marketplaces with platform tech (Adobe Exchange, Salesforce, DigitalOcean)
 - Wide variation for other digital content marketplaces with no platform technology, with 30% or more being common
- The App Store **effective commission** is **far less than 30%**
 - The effective commission – the rate developers pay when considering revenues *facilitated by* the App Store – falls between **2%** and **20%** for a range of digital goods and services (“DGS”) app categories, including games
 - The effective commission is less than the headline commission because Apple has **reduced the commission level and incidence** over time
 - E.g., Apple allows multiplatform and “reader” apps to generate sales outside the App Store **with no commission**; when taking these additional sales into account, developers pay far less than headline rates
 - Developers can also monetize through ads, on which Apple charges **no commission**
- Some platforms are able to charge a commission on transactions they facilitate, even when payments happen through third parties
 - Reflects value of platforms and marketplaces beyond payment processing and related services
 - Incremental fees when payment occurs on platform are often **1%–4%**

Benchmarking: App store commissions

- Commissions across app stores typically fall between **15%** and **30%**

Select app store (platform technology)	Description of platform	Headline commission rate
Apple App Store		<ul style="list-style-type: none"> 30% default 15% (Small Business Program) 15% (in-app subscriptions over 1 year) 15% (premium video apps) 15% (in-app subscriptions for Apple News publisher participants)
Google Play Store	<ul style="list-style-type: none"> Android apps Software tech Developer tools for app creation, testing, and distribution 	<ul style="list-style-type: none"> 30% (default) 15% (under \$1m or auto-renewed subscriptions)
Amazon Appstore	<ul style="list-style-type: none"> Android apps, especially for Amazon Fire tablets Developer tools for app submission and monetization 	<ul style="list-style-type: none"> 30% (default or if total revenues over \$1m) 20% (if total revenues under \$1m)
Samsung Galaxy Store *	<ul style="list-style-type: none"> Android apps on Samsung Galaxy devices Developer tools for app creation and integration with Samsung devices Limited to Samsung Galaxy devices 	<ul style="list-style-type: none"> 30% (default, or otherwise agreed-upon rate)
Microsoft Store **	<ul style="list-style-type: none"> Windows-compatible apps, PC entertainment Developer tools for app creation and distribution on Windows platforms 	<ul style="list-style-type: none"> 15% (apps and IAP on Windows 11) 12% (PC games) 0% (non-games with 3P payment)
Alexa Skills	<ul style="list-style-type: none"> Alexa-compatible features, games, and applications 	<ul style="list-style-type: none"> 20%
Select app store (no platform technology)	Description of platform	Headline commission rate
One Store (Korea)	<ul style="list-style-type: none"> Apps for mobile devices (non-iOS), popular in Korea Developer tools for app creation, testing, and distribution 	<ul style="list-style-type: none"> 20% (default) 5% (if developer uses 3P payment)

* Samsung Galaxy Store platform technology is more limited, given the relatively smaller base of Samsung Galaxy devices.

** In July 2021, Microsoft reduced its commission rate on non-Xbox apps and games and allowed third-party payment for non-Xbox non-game apps. Microsoft charges a higher commission rate for Xbox games (with platform technology) than for Windows games (with no or little platform technology).

Benchmarking: Game store commissions

- Commissions across game store marketplaces typically fall between **20%** and **30%**
 - Those including platform technology (console game marketplaces: Xbox, PlayStation, Nintendo) often charge more than distribution platforms with little or not platform technology

Select game marketplace (platform technology)	Description of platform	Headline commission rate
Xbox	<ul style="list-style-type: none"> Subset of Microsoft Store Games, entertainment on Xbox console Developer tools for creating (including game engine) and publishing games 	<ul style="list-style-type: none"> 30%
PlayStation	<ul style="list-style-type: none"> Games and entertainment on PlayStation devices Developer tools for creating (including game engine) and publishing games 	<ul style="list-style-type: none"> 30%
Nintendo	<ul style="list-style-type: none"> Games, entertainment on Nintendo devices Developer tools for creating and publishing games 	<ul style="list-style-type: none"> 30%
Select game marketplace (no platform technology)	Description of platform	Headline commission rate
Steam	<ul style="list-style-type: none"> Distribution and monetization platform for PC games Developer tools for game creation and distribution Community features and multiplayer integration 	<ul style="list-style-type: none"> 30% (under \$10m revenue) 25% (between \$10-50m revenue) 20% (above \$50m revenue)
Epic Games	<ul style="list-style-type: none"> Distribution platform for PC games Developer tools for game creation (including game engine) and distribution 	<ul style="list-style-type: none"> 12% (unprofitable, possibly litigation driven – includes Unreal Engine royalty)
Origin	<ul style="list-style-type: none"> Electronic Arts games and games from select third-party developers Community features 	<ul style="list-style-type: none"> Unknown
WeGame	<ul style="list-style-type: none"> Tencent marketplace for games from various developers Developer tools such as WeGame SDK and API 	<ul style="list-style-type: none"> Negotiated case-by-case
Game Jolt	<ul style="list-style-type: none"> Marketplace for independent video games 	<ul style="list-style-type: none"> 0%–10% (chosen by developer)
Itch.io	<ul style="list-style-type: none"> Marketplace for independent video games 	<ul style="list-style-type: none"> 10% (default, developer can choose to change to any value)

Benchmarking: Software add-on commissions

- Commissions across software add-on marketplaces with platform technology typically fall between **15%** and **25%**

Select software add-ons	Description of platform	Headline commission rate
Adobe Exchange	<ul style="list-style-type: none"> Adobe-compatible extensions and plug-ins Developer tools for creating, publishing extensions 	<ul style="list-style-type: none"> 15%
Salesforce AppExchange	<ul style="list-style-type: none"> Third-party apps integrated with Salesforce Developer tools to integrate CRM with other products 	<ul style="list-style-type: none"> 15% (independent software vendor) 25% (OEM embedded apps)
Shopify App Store	<ul style="list-style-type: none"> Shopify-compatible third-party apps and integrations Enhances functionality of Shopify-powered stores Developer tools for creating, publishing extensions 	<ul style="list-style-type: none"> 20% (default) Reduced rate plan upon registration: 0% under \$1m; 15% over \$1m
DigitalOcean Marketplace	<ul style="list-style-type: none"> Deploys pre-configured applications, cloud infrastructure 	<ul style="list-style-type: none"> 25%
Atlassian Marketplace	<ul style="list-style-type: none"> Apps, add-ons, plug-ins, integrations with Atlassian products Jira, Confluence, Bitbucket, and more Developer tools for creating, publishing products 	<ul style="list-style-type: none"> 15% (cloud apps) 25% (data center apps) 25% (server apps)

Benchmarking: Digital content commissions

- Commissions across digital content marketplaces vary significantly with 30% or greater headline commission rate being common; these marketplaces do not offer platform technology

Select digital content marketplace	Description of platform	Headline commission rate
Spotify for Podcasters	<ul style="list-style-type: none"> Platform for creators to upload, distribute podcasts Offers tools to monetize podcasts through subscriptions or ads Tools for analytics, growing audience 	<ul style="list-style-type: none"> 30% for Ambassador ads feature 5.5% for subscriptions 0.8-1.6% (foreign exchange fee) \$0.20–0.30 (cash-out fee)
Twitch	<ul style="list-style-type: none"> Platform for live streaming (primarily gaming), interacting with audience Tools for creators to monetize content 	<ul style="list-style-type: none"> 50% (subscriptions) 25% (advertising minimum)
Roku	<ul style="list-style-type: none"> Media platform for TV and video content, such as streaming, apps, or stand-alone titles 	<ul style="list-style-type: none"> 20% (pay-to-install or in-channel purchases) 30% (of advertising inventory)
YouTube	<ul style="list-style-type: none"> Video-sharing platform that allows users to upload and/or watch videos Creator tools to edit videos, engage with audience, monetize content 	<ul style="list-style-type: none"> 30% (channel memberships) 30% (Super Chats, Stickers, Thanks) 45% (Partner advertising) 55% (Shorts advertising)
Amazon Prime Video Direct	<ul style="list-style-type: none"> Self-publishing platform for creators to upload, distribute videos on Prime Video 	<ul style="list-style-type: none"> 50% (purchases, rentals)
Kindle Direct Publishing	<ul style="list-style-type: none"> Self-publishing platform for authors to publish, distribute paperback and eBooks books through Amazon and Kindle 	<ul style="list-style-type: none"> 30% (US ebooks between \$2.99–\$9.99) 65% otherwise
Barnes and Noble Press	<ul style="list-style-type: none"> Self-publishing platform for authors to publish, distribute paperback and eBooks books through Barnes and Noble and Nook 	<ul style="list-style-type: none"> 30% (ebooks) 45% (print books)
Kobo	<ul style="list-style-type: none"> Self-publishing platform for eBooks, audiobooks Offers creators ability to be paid based on time spent on their titles 	<ul style="list-style-type: none"> 30% (ebooks between \$1.99–\$12.99; 55% otherwise) 55% (audiobooks over \$2.99; 65% if under)
Audible	<ul style="list-style-type: none"> Platform for distributing audiobooks that supports self-publishing Supports creators by funding creation of exclusive content 	<ul style="list-style-type: none"> 60% (exclusive content) 75% otherwise
Patreon	<ul style="list-style-type: none"> Platform for creators to interact with their communities, build their business Provides tools for marketing, hosting multimedia content, tax filings, etc. 	<ul style="list-style-type: none"> 8% (Pro) 12% (Premium) <p><i>Plus payment processing, currency conversion, payout fees, and payment processing, and applicable taxes</i></p>

App Store effective commissions: Reduced over time

- The App Store “effective commission” is the commission rate developers pay when considering revenues *facilitated by* the App Store, not just *billings through* the App Store
- The App Store effective commission rates are **far less** than headline rates because Apple has **reduced the commission level and incidence** over time:
 - **2011:** Apple allows “reader” apps – no commission on purchases made outside App Store
 - **2017:** 15% commission on in-app subscriptions lasting over a year and for premium video apps (Video Partner Program)
 - **2018:** Apple allows multi-platform services – no commission on purchases made outside App Store
 - **Jan 2021:** 15% for developers earning up to \$1m per year (Small Business Program)
 - Mar 2021: Google lowers Play Store commission on first \$1m of revenue from 30% to 15%
 - Oct 2021: Google reduces Play Store commission on IAP subscriptions from 30% to 15%
 - **Jan 2021:** 15% commission on in-app subscriptions for news publishers who participate in Apple News
 - July 2021: Microsoft reduces commission on non-Xbox apps and games, allows third-party payment for non-Xbox non-game apps
 - **2022:** Apple allows “reader” apps to direct customers to their own websites to manage accounts; communicate with users

App Store effective commissions: Analysis

- As noted above, Apple does not charge a commission on multiplatform and reader app sales that occur outside of the App Store despite being consumed on iOS apps; developers can also monetize through ads, on which Apple charges no commission
- We therefore estimate effective commission rates using **total billings and sales** facilitated by the App Store from the 2021 ecosystem study, which takes into account multiplatform usage, reader app carveouts, and advertising revenues
- We find that the average effective commission rate across select categories was [REDACTED] in 2021, far less than both the headline commission and the actual commission rate paid based only on App Store billings

Selected app category	App Store billings (\$B)	Facilitated billings and sales estimate (\$B)	Actual commission rate	Effective commission rate*
Games	[REDACTED]			
Video streaming				
eBooks and audiobooks				
Music streaming				
News and magazines				
Enterprise				
Other				
Total				

Notes:

* Non-games advertising is only available in aggregate. We added non-game advertising to the total to calculate a more accurate average commission rate. Category level effective commission rate are underestimates for all categories but games as they do not incorporate advertising.

[1] Facilitated billings and sales estimate from 2021 ecosystem study. Facilitated billings and sales for the Other category was proxied by App Store billings. For games, facilitated billings and sales is App Store billings plus advertising revenues. For non-games, advertising revenues are [REDACTED].

[2] Effective commission rate calculated as (Actual commission rate) × (App Store billings / billings and sales facilitated by the App Store).

[3] Video streaming billings and sales estimate includes Apple TV revenues.

Benchmarking details: Platform fee structures

- Certain platforms charge separately for (i) using/accessing the platform and (ii) processing payments on the platform
 - Shows that charging a commission even when payments happen through third parties is possible and supported by the market
 - The **value** of a platform **extends beyond payment processing** and related services
 - Incremental fees when payment occurs on platform are typically **1%–4%**

Selected marketplace	Fees for platform use	Incremental fees when payment occurs on-platform
Google Play*	<i>List app on app store (platform tech, developer tools and services, discovery, distribution):</i> <ul style="list-style-type: none"> • 26% (27% EEA) default • 11% (12% EEA) under \$1m or auto-renewed subscription 	Use Google Play Store billing system: 4% (3% EEA)
Shopify	<i>Access to platform (create storefront, retail reports, use logistics tools) + off-platform payment fees:</i> <ul style="list-style-type: none"> • \$39 / mo. + 2.0% (Basic) • \$399 / mo. + 0.5% (Advanced) • \$2,000 / mo. + 0.15% (Plus) 	<i>Use Shopify Payments:</i> <ul style="list-style-type: none"> • 0.9% + 30¢ (Basic) • 1.9% + 30¢ (Advanced) • 2.0% + 30¢ (Plus)
Etsy	<i>Transaction fee and listing fee per item:</i> 6.5% + 20¢ / listing	Use Etsy Payment: 3% + 25¢
Booking.com	<i>Commission per travel reservation (paid even if guest pays at the property):</i> 15%	<ul style="list-style-type: none"> • <i>Payment through virtual credit cards:</i> Passthrough of credit card per transaction fees • <i>Payment through bank transfer:</i> 1.1% to 3.1%
One Store (Korea)	<i>List app on app store (distribution, discovery, developer tools and services):</i> 5%	Use One Store's payment system: 15%

*Google Play allows developers to display alternative billing systems for IAP in India and South Korea, and for non-games IAP in the European Economic Area (EEA) and for developers participating in a pilot program

Part 3. Economic framework for considering alternative pricing options

Off-app purchases: Summary

- How to charge a commission or fee for a purchase that happens after the user clicks a link that goes out of the app? Possible benchmarks:
 - **Affiliate programs**, which offer affiliates (e.g., bloggers, publishers, website owners) a commission on referrals during a given time window to promote products
 - **Tracking windows** (or cookie durations) determine the time period within which affiliates can earn a commission; a commission is paid if buyer clicks affiliate link, makes purchase within specified time
 - This requires a **tracking mechanism** to follow off-app activities; tracking mechanisms can be customer-based (i.e., cookies stored on customer hardware keep track of an affiliate click) or server-to-server based (i.e., a tracking link that includes affiliate information and is connected with a purchase by the seller's server)
 - The time period during which an affiliate earns a commission for a referral vary significantly (between **24 hours** and **90 days** among the examples in our review)
 - **Ad campaigns run by developers** with the help of Mobile Measurement Partners ("MMPs"). MMPs attribute app installs and re-engagement to ads based on either ad clicks or ad views ("view-through") during a given window or through probabilistic models. They similarly need tracking mechanisms to link ad views or clicks to installs or re-engagement
 - Typical default MMP lookback windows are **7 days click** and **1 day view-through**
 - Effective cost per install in the US is **\$5.30** (\$6.60 for games)
 - **The goal of a typical affiliate program or ad campaign run by developers is discovery**, which is believed to be effective during a limited time window; platform tech, developer tools and services, and distribution may contribute continuously to purchases of DGS used on the platform and provide value beyond any time window

Note: effective US cost per install estimate includes both iOS and Android; the iOS eCPI is likely higher.

First-party affiliate programs

- Firms can use affiliate programs to sell their own products (“first party”)
- For first-party affiliate programs, tracking windows range between **14 days** and **90 days** for the examples we reviewed
- Affiliate commission rates are between **1%** and **20%** for the examples we reviewed
- Economics suggests that the affiliate commission rate would be related to the profit margin of the first on the promoted products
 - Hence direct comparison of affiliate commission rates is not straightforward (e.g., an affiliate commission rate of 1% on a product with a small margin could be equivalent to a 50% commission rate on a product with a high product margin)

Affiliate program	Description	Tracking window	Affiliate commission rate
Bluehost	Affiliates use ads, links to promote Bluehost web hosting services (e.g., WordPress)	90 days*	\$65 per sale
Norton LifeLock	Affiliates use ads and links to promote Norton LifeLock cybersecurity products and services	30 days*	20%
Wall Street Journal	Affiliates use unique links to promote subscriptions to WSJ-affiliated publications	30 days	\$24 per sale
Microsoft	Affiliates use ads or links to promote certain Microsoft first-party products or services (e.g., Xbox consoles, Office 365)	14 days	\$1.30–\$10 (subscription) 1%–7% (varies by category)**
McGraw Hill	Educational partners promote products, including ebooks	30 days	8% (eBooks) or 4% (books)

Notes: [*] first-party source. [**] See Appendix slides for details on by-category variation.

Platform affiliate programs

- Platforms can also use affiliate programs to boost the sales of third-party merchants on the platform
 - In some cases, the platform may also offer their own first-party products (e.g., Amazon)
- Tracking windows range between **24 hours** and **30 days** for platforms selling third-party products for reviewed examples
- Affiliate commission rates are between **1%** and **10%** for reviewed examples
 - Platforms only earn revenues from commissions for sales by third parties
 - Economics would suggest that the affiliate commission rate would be related to the platform commission on the sales made by third-party merchants
 - Effective affiliate commission rates are between **7%** and **67%** of platform commission
 - We observe variation in rates within individual affiliate programs; retailers may offer higher affiliate commission rates for products with more affiliate-driven demand (e.g., fashion) and/or products with higher platform commissions

Affiliate program	Description	Tracking window	Affiliate commission rate	Effective affiliate commission rate out of platform commission
eBay	Partners create content to promote certain eBay listings or product categories	24 hours*	1%–4% (varies by category)**	8%–47%
Etsy	Affiliates create content to promote certain Etsy listings and drive traffic and sales to Etsy	30 days (7 days in app)*	4%	62%
Amazon**	Affiliates use ads or links to promote certain Amazon products or categories	24 hours*	1%–10% (varies by category)** \$0.15–\$15 (subscription)	7%–67% (goods)
Walmart**	Affiliates use ads or links to promote certain Walmart products or categories	3 days	1%–4% (varies by category)**	7%–27%

Notes: [*] first-party source. [**] See Appendix slides for details on by-category variation; Amazon and Walmart sell both first and third-party products. 63% of Amazon's sales are third-party sales.

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Notes: [*] first-party source. [**] See Appendix slides for details on by-category variation; Amazon and Walmart sell both first and third-party products. 63% of Amazon's sales are third-party sales.

Developer ad campaigns

- Developers use MMPs to measure the effectiveness of their ad campaigns
 - MMPs attribute app installs to ads based on either ad clicks or ad views (“view-through”), or probabilistically
 - MMPs can also track other events, e.g., re-engagement (users re-opening or installing app previously used)
- MMPs allow developers to calculate the effective cost per app install (eCPI) as the ratio of ad spend to downloads
 - The eCPI in the US is approximately **\$5.30** overall (\$6.60 for games). This estimate includes both iOS and Android; the iOS eCPI is likely higher

Length of click and view-through lookback windows

- As part of the attribution process, MMPs allow developers to set the length of click and view-through lookback windows (i.e., how long after the ad click/impression a user installs an app)
 - Typical default MMP lookback windows are **7 days click** and **1 day view-through**
 - Certain “walled garden” ad networks called self-attributing networks (“SAN”s), like Google, Meta Ads, Snapchat, or Apple Search Ads, use longer click default windows, up to 30 days

MMP	Click lookback window	View-through lookback window
Adjust	7 days	1 day
AppsFlyer	7 days	1 day
Branch	7 days	1 day
Kochava	30 days	1 day
Singular	7 days	1 day
SAN	Click lookback window	View-through lookback window
Apple Search Ads	30 days	30 days
Facebook	7 days	1 day
Google	30 days	1 day
Snapchat	28 days	1 day
Twitter	30 days	1 day

Note: Default lookback windows shown. Developers can manually adjust the length of their lookback windows.

Leakage risks

- If Apple charges a commission for off-app purchases, **leakage** may become an issue and reduce commissions charged
 - Leakage: When participants meet on a platform but take their transactions off-platform to avoid paying a commission
- Leakage important to:
 - Predict who will keep using IAP vs. link out
 - Think about how to price if monitoring revenue and charging a commission is not possible
- What **factors** determine the potential magnitude of leakage (relevant for App Store)?

Value of typical transaction

With no leakage, marketplaces typically find it optimal to charge higher fees for higher-value transactions. However, high fees incentivize parties to transact off the platform (e.g., Airbnb vs. Uber).

One-off vs. repeated transactions

Repeated transactions build trust, making parties more willing to transact directly and off platform (e.g., dog walker vs. Uber driver); they also make parties more likely to pay frictional costs to bypass platform (i.e., fixed costs), since such costs are spread across more transactions.

Value of transacting on the platform

The more frictions between parties, the higher the value of transacting on the platform. For example, asymmetric information makes it riskier to transact directly. Setting up payment also requires trust.

How to price with leakage and collection risks

- **Collection risks** are also an issue if Apple has no visibility into transactions: developers may not pay the commissions they owe
 - Incorporating 3P payment solutions within the purchase flow managed by Apple so it would stay within the app could improve visibility into transactions (may help for one-off purchases like coins, may not help for recurring charges like subscriptions)
- When leakage is so large that platforms are unable to use transaction fees, they often monetize through other types of fees, such as:
 1. **Subscription fees** to one or both sides of the platform
 - ZipRecruiter has several tiers of subscription fees for recruiters based on the number of allowed job postings
 - Dating platforms (e.g., Bumble, Hinge, Tinder) have several tiers of subscriptions based on allowed functionalities
 2. Fees for **listing, advertising**, or for **more important placement on the platform**
 - Taobao had a no-fee model and attempted a “bidding for ranking” model, reserving the best slots in each channel for bidding
 3. Fees to product or service providers **for new customer referrals**
 - Thumbtack helps consumers find service professionals
 - Capterra helps businesses find suitable business software

Platform commissions vs. flat fees

- **Commissions** are paid per effective transaction and regulate activity on a platform
 - From a developer perspective, **commissions make innovation (creating new apps) and platform participation less risky**
 - Apple technology and services are provided for a minimal fee, and developers only pay if they receive revenue from an app
 - However, commission structures can lead to platform leakage as developers seek to avoid paying commissions
- **Flat fees** help control participation in a platform by making the use of a platform costly
 - From a developer perspective, **flat fees increase risk and may discourage innovation**
 - Developers have to pay a fee to participate on the Apple platform regardless of the success of their app. This fixed cost encourages safe apps and less risk-taking
 - However, flat fees can also be structured to scale with developers' willingness to pay for platform participation, so that developers who value the platform less pay less to use it (e.g., tiered pricing for small developers)

Mechanism design 101

- When thinking about what allowing payments outside of the App Store could mean for Apple, there is a need to consider developers' and users' behavior
 - **Individual rationality (“IR”)** or participation constraint
 - Think at the margin: a developer will make a decision “at the margin” based on their own numbers, not based on the average (e.g., a \$15 cost per click may make sense for a yearly subscription but not for purchasing a \$4 boost)
 - **Incentive compatibility (“IC”)**
 - If using segmented pricing such as game v. non-game, want to price such that game developers pick the game pricing, and non-game pick the non-game pricing
- The current App Store pricing model is based on two core Apple principles: everybody is charged the same (with some caveats), and design is simple
- An alternative pricing model would need to:
 - Consider simple tiering (free tiers for small developers; increasing or decreasing price depending on goal)
 - Think about what incentives are being created and how developers will try to go around them (e.g., if Apple charges a commission on purchases made within 24 hours of a click, developers could try to create incentives to get users to pay more than 24 hours later)

Appendices

Appendix 1. Platform technology

Platform technology: Summary of prior findings

- We evaluated pricing for platforms similar to Apple's platform technology

App store technology platforms

- Smartphone app stores, gaming consoles, Shopify app store: bundled pricing broadly similar to App Store
- Computer operating systems: free
- Smart TVs: commissions can be charged on ad revenue
- e-commerce business services: commission-based pricing, rates decline with revenues

Brick-and-mortar retail

- Airports, malls: frequently include "percent leases" with built-in commission
- Farmers' markets, grocery stores, movie theaters: negotiated pricing

Technology infrastructure only

- Chip foundries, ghost kitchens: negotiated rates frequently include commission
-
- We did not include platforms for which the "platform technology" aspect is less relevant (i.e., which primarily help with commerce, distribution, and discovery)
 - Therefore, excluding marketplaces such as Uber, Airbnb, and eBay

Platform technology detail: E-commerce business services

- E-commerce business services provide technological tools for capability expansion but have no demand generation aspect
 - Create e-storefront: build website, web hosting, DNS services
 - Manage orders and deliveries: inventory management, shipping assistance
 - Use customer data: get and interpret sales analytics
- Examples: Shopify and Adobe Commerce (Magento)
 - **Pricing:** charge $\approx 0.5\% - 5\%$ of revenue, decreasing with volume
- Considerations:
 - Most of what e-commerce stores sell are physical goods and services, which have high marginal costs (product/service costs + fulfillment); very different from digital goods and services, which typically have very low marginal costs (in particular games; not necessarily the case when apps need to pay royalties based on usage)
 - Calculate low marginal cost equivalent by normalizing with e-commerce margins (25%–40%)
 - **Pricing equivalence:** $\approx 1\% - 20\%$ for digital goods and services with low marginal cost (decreasing with volume)

Platform technology detail: Physical retail platforms

- Physical retail platform operators own and lease retail space to retail stores as part of bigger complexes (e.g., airports, malls)
 - In addition to physical space for store, provide a common physical space for customers and amenities (e.g., free parking, bathrooms)
 - Manage upkeep of property
 - Manage security, taxes, and regulation
- **Pricing:** physical retail spaces often charge \approx **5%–20%** of store revenue in percentage rent
- Price discrimination for airports
 - Low margin businesses pay lower %
 - Tiered percentage rent can be increasing (e.g., SFO)
 - Single concessionaire of business type pays more
- Adjustments?
 - High marginal costs for stores (COGS) (would want to adjust up)
 - Physical space can be expensive (potentially would want to adjust down)

Platform technology detail: Shopping malls / Airports

Offer physical space for stores and customers along with ancillary services like restrooms. Shopping may be the primary (mall) or ancillary (airport) purpose.

	Similar to Apple platform tech	Different from Apple platform tech
Common infrastructure	<ul style="list-style-type: none"> Attract stores and customers by providing high-quality infrastructure (e.g., climate control, maintenance, cleaning, restrooms) Provide a well-trafficked space for concession stores to build on Provide security and compliance (e.g., permits) 	<ul style="list-style-type: none"> Infrastructure is physical-only Physical space constraints, potential for crowding Platform controls supply (e.g., by limiting the total number of stores and stores of any given type)
Capability expansion	<ul style="list-style-type: none"> Somewhat limited Complementarities among stores can increase sales 	<ul style="list-style-type: none"> Physical infrastructure limited by its dual role (e.g., staff and goods must go through security at airport concession stores) Physical location determines customer base and hence capability expansion Customer base may be captive (e.g., airports, sporting events)

Pricing model

- Rent space to stores; rates are determined by square footage, location within the complex, expected sales, and complex quality/location (like real estate leases)
- "Percent leases": pay a minimum fixed fee and a share of monthly revenue (e.g., vendor pays rent plus 10% of revenue to airport)
- Price discrimination: Percent leases enable price discrimination; special rates for first-time vendors

Examples: malls, airports, department stores

Platform technology detail: Airport concessions

- Typically, a **percentage of revenues** (i.e., commission rate) of **~8%–18%** and a **minimal annual guarantee**
- Pricing varies *across* airports
- Pricing varies *within* airports based on business characteristics:

Within-Airport Pricing Heterogeneity	
Type	<p>Lower-margin types of businesses pay a lower commission rate</p> <ul style="list-style-type: none"> Lower revenue percentage (8%–15%) for specialty retail and food Higher revenue percentage (15%–18%) for convenience retail (e.g., Hudson News)
Revenues	<p>Higher-revenue businesses pay a higher marginal commission rate</p> <ul style="list-style-type: none"> Higher rates for greater concessionaire revenues <ul style="list-style-type: none"> <i>Example:</i> SFO commission rate is 12% below \$500k in annual revenue, 14% between \$500k and \$1m, and 16% above \$1m
Owner	<p>Small, minority-, women, or disabled-owned businesses pay a lower commission rate</p> <ul style="list-style-type: none"> Discounts for disadvantaged business owners (mandated by federal law in US) Discounts for small businesses
Model	<p>Businesses that lease all stores within a category pay a higher commission rate</p> <ul style="list-style-type: none"> Higher revenue percentage when all category space is leased to a single concessionaire (e.g., all bookstores are W.H. Smith)

Platform technology detail: Cloud services

- Developers can use Apple platform technology to run apps, or run similar apps on the cloud

	Apple platform value	Cost comparable
Application (General cloud)	Apps run on Apple hardware; developers could instead run website/webapps	Cost of hosting, cloud compute, and cloud storage
Storage (CloudKit)	iCloud stores app data securely for efficient syncing, monitoring and management; developers could instead use third-party cloud services	Cost of secure, worldwide, enterprise-grade cloud infrastructure to replicate CloudKit
Processing (Core ML)	Developers can use on-device ML capabilities; developers could instead use cloud services to run ML	Cost of cloud ML resources (cloud compute, cloud storage)
Gaming (Cloud Gaming)	Gaming apps rely on iPhone technology, graphics, frameworks, and computing resources; developers could instead use cloud gaming infrastructure to stream games	Cost of operating cloud gaming infrastructure: computing/graphics resources, data transfer as % of revenue

Appendix 2. Developer tools and services

Developer tools and services

- Pricing varies by product type and developer size, and can be subscription- or usage-based
- Many tools and services are also provided for free by large companies^[A] or non-profit organizations

		Comparable Examples	Pricing	
			Small	Large
Subscription-based	Integrated Development Environment	App Code, MS Visual Studio, Gluon, Sublime Text	\$200–\$1,300 per developer-seat	\$200–\$3,000 per developer-seat
	Programming languages and compilers	Java, Elements, C++ Front End	\$800+	\$8,000–\$50,000
	Developer programs	Google Play, Amazon Appstore, Samsung Galaxy	\$0–\$25 ^[A] per developer	
	Developer analytics	App Annie, Qonversion, Amplitude Analytics, Google Analytics, Appfigures, Mixpanel	\$3,600–\$24,000	\$36,000–\$60,000
Usage-based	Frameworks, API libraries	Firebase (cloud), Unity (game), Google Maps and Bing (map), Plaid, Terra, Twilio	tiered, depending on requirements	
	Innovative technologies	ARKit, Push Notifications, LiveChat, Fairplay Streaming	tiered, depending on features	
	Testing tools	Appetize, Kobiton, Perfecto, Circle CI, TestFairy, MS App Center	tiered, depending on requirements	
	Developer protections	Android DRM, SafetyNet	free ^[A]	
	Developer education & support	Microsoft Build, Google I/O, Udemy, Code Academy, CodeMonkey	tiered, depending on courses and participants	

^[A] Offered by a digital platform using the same model as Apple (e.g., Google Play), which therefore does not reflect stand-alone pricing

Developer tools and services: Assumed packages

	Small Developer 3-8 developers	Large Developer 10-20+ developers
Integrated Development Environment	<ul style="list-style-type: none"> Cross-platform development plus some advanced capabilities \$200–\$1,300 per developer-seat 	<ul style="list-style-type: none"> Cross-platform development plus advanced capabilities \$200–\$3,000 per developer-seat
Programming languages and compilers	<ul style="list-style-type: none"> Compilers with multiple language support \$800 per developer-seat 	<ul style="list-style-type: none"> Compilers with advanced capabilities for multiple languages including C++ \$8,000–\$50,000
Developer analytics	<ul style="list-style-type: none"> Tool capabilities include app analytics, data export, subscriber trends and financial reports \$3,600–\$24,000 	<ul style="list-style-type: none"> Same capabilities as small developer \$36,000–\$60,000
Frameworks, API libraries	<ul style="list-style-type: none"> Advanced capabilities not required 	<ul style="list-style-type: none"> Cross-platform game development (3D, VR & AR) Unity Enterprise license: \$48,000 for 20 developer seats
Testing tools	<ul style="list-style-type: none"> Xcode simulator and capabilities offered by TestFlight \$480–\$4,800 	<ul style="list-style-type: none"> Same capabilities as small developer plus additional requirements \$24,000–\$36,000
Innovative Technologies	<ul style="list-style-type: none"> Advanced capabilities not required 	<ul style="list-style-type: none"> Unreal Engine (or comparable) licensing: 5% of revenues above \$1m
Total Cost (approximate, average)	\$10–15k	\$50k+

Developer tools and services: Cost estimate (games)

- **DT&S pricing:** between [REDACTED] and [REDACTED] of average revenues
 - Because of fixed costs, DT&S costs may be as much as [REDACTED] of revenues for small developers

	Small developer		Large developer	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Annual revenues	[REDACTED]			
Number of developers				
DT&S category				
IDEs				
Programming languages				
Developer programs				
Developer analytics				
Frameworks				
Innovative technologies				
Testing tools				
Developer protections				
Dev. education & support				
Total	[REDACTED]			
Total (% revenue)				
Average (% revenue)				

Notes: Annual revenue cutoffs from 2020 App Store billings data. “Small developers” are assumed to have between \$10,000 and \$1 million in revenue, and “Large developers” are assumed to have over \$1 million in revenue. Revenue cutoffs represent average billings for non-game (low) and game (high) developers. Cost estimates are based on price ranges of comparable tools in each DT&S category. Fees for developer programs and developer education & support are often negotiated and likely minimal, so these costs were not included.

Developer tools and services: Cost estimate (other)

- **DT&S pricing:** between [REDACTED] % and [REDACTED] % of average revenues
 - Because of fixed costs, DT&S costs may be as much as [REDACTED] of revenues for small developers

	Small developer		Large developer	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Annual revenues	[REDACTED]			
Number of developers				
DT&S category				
IDEs				
Programming languages				
Developer programs				
Developer analytics				
Frameworks				
Innovative technologies				
Testing tools				
Developer protections				
Dev. education & support				
Total	[REDACTED]			
Total (% revenue)				
Average (% revenue)				

Notes: Annual revenue cutoffs from 2020 App Store billings data. “Small developers” are assumed to have between \$10,000 and \$1 million in revenue, and “Large developers” are assumed to have over \$1 million in revenue. Revenue cutoffs represent average billings for non-game (low) and game (high) developers. Cost estimates are based on price ranges of comparable tools in each DT&S category. Fees for developer programs and developer education & support are often negotiated and likely minimal, so these costs were not included.

Appendix 3. Discovery

Discovery: Cost estimation further assumptions

	Small business		Large business	
	Games	Non-games	Games	Non-games
Average annual revenue				
Average downloads per developer				
Revenue per download				
Average downloads per developer				
Downloads from App Store browse				
Target audience				
Estimated Cost Per Install (eCPI)				
Revenue per download				
Advertising cost per download				

Notes:

[1] Average annual revenue and downloads only for developers with IAP revenue in 2022.

[2] "Small businesses" are developers with fewer than 1 million downloads and fewer than \$1m in earnings in 2022, who have consistently had more than 1,000 annual downloads.

"Large businesses" are developers with at least \$1 million in earnings or 1 million downloads in 2022.

[3] Downloads from App Store browse is calculated as the weighted average across app categories of the ratio between the number of downloads in 2022 originated from the Today, Games, and Apps tabs of the App Store (the browse channel) and the downloads originated from the browse, referrals, and search channels. App categories are weighted by the number of downloads originated from the browse channel.

[5] Advertising cost per download is equal to the minimum between Annual revenue per download and the Cost per Install (CPI).

[6] Cost per install is the effective price the developer pays each time a user installs their app as a result of an ad campaign. CPI is estimated as total ad campaign spend divided by the number of new (tracked) app installs from ad campaign. CPI is assumed to be equal to \$3.60 for Non-Games and \$4.30 for Games. Source: "Cost Per Install (CPI) Rates (2023)," Business of Apps, www.businessofapps.com/ads/cpi/research/cost-per-install.

[7] Advertising costs are from the Platform iOS discovery value category. Non advertising cost is calculated as the sum of the minimum non-zero cost for each value category from product pages, curation and personalization, and optimization and data analytics. See next slide for more details.

Discovery: Comparable alternatives cost assumptions

		Small business	Large business
Product pages	Templates or web developer	(accounted for in Distribution)	(accounted for in Distribution)
	Trustpilot	\$250/month => \$3,000/year	\$900/month => \$10,800/year
		\$3,000/year	\$10,800/year
Curation and personalization	Google Analytics	Free	Free
	Kissmetrics	\$299/month => \$3,588/year	\$499/month => \$5,988/year
	Optimizely	unknown pricing	unknown pricing
		\$3,588/year	\$5,988/year
Optimization and data analytics	Google Optimize	free	free
	Optimizely	unknown pricing	unknown pricing
	VWO	\$1,266/month => 15,192/year	\$3,563/month => 42,756/year
	Zoho	\$780/month => 9,360/year	service not large enough
	Unbounce	\$625/month => 7,500/year	service not large enough
		\$7,500/year	\$42,756/year
Platform and iOS discovery	Google/Facebook advertising costs	advertising cost per download x target audience	advertising cost per download x target audience
	ProductHunt	free	free
	AlternativeTo	free	free
		Advertising cost per download x Target audience	Advertising cost per download x Target audience

Notes:

[1] Trustpilot assumes a Standard plan for small businesses and a Scale plan for large businesses.

[2] Kissmetrics assumes a Silver plan for small businesses and a Gold plan for large businesses.

[3] VWO pricing assumes tracking of 250k monthly users for small businesses and 1M monthly users for large businesses.

[4] Zoho pricing for small businesses assume 1M monthly visitors which is the largest tier for which pricing is available on their website.

[5] Unbounce pricing assumes the lower bound of their Concierge service for small businesses and none for large businesses. Their Concierge service considers a starting point of 100k unique visitors per month.

[6] Optimizely only offers customized services and no pricing is available in their website.

[7] Google/Facebook advertising is assumed to cost the minimum between the revenue per download and the estimated cost per install times the target audience, which is estimated as the percentage of downloads originated from the Browse channel (Today, Games, and Apps) times the average number of downloads per developer.

Appendix 4. Affiliate commission rates

Microsoft affiliate commission rates

Category	Affiliate commission rate
PC and other accessories	1%
Products and services that are not mentioned	1%
Xbox accessories and consoles	2%
Microsoft Surface and accessories	2%
Xbox Game Pass	2%
Paid applications	2%
Xbox Live Gold	2%
Additional Microsoft and Office products	5%
TV shows and movies	7%
Xbox games (Microsoft or third-party)	7%

Note: In some cases, the Microsoft and Xbox stores also sell third-party products and services (e.g., third-party Xbox games and hardware). In that case, the effective affiliate commission rate out of Microsoft's platform commission would be higher.

Walmart affiliate commission rates

Category	Affiliate commission rate	Walmart commission rate	Effective affiliate commission rate out of Walmart commission
Electronics, cameras and supplies, wireless	1%	8%	12.5%
Media & gaming	1%	15%	6.7%
Toys, books & magazines, seasonal, celebration, stationery, sporting goods, automotive, hardware & tools/do it yourself, patio and garden, horticulture, arts, crafts, sewing & fabric, cook and dine, home decor, bath and shower, bedding, home management, furniture	3%	15%	20%
Pets and supplies, beauty, baby hardlines	3%	15%*	20%
Apparel and accessories	4%	15%	26.7%
Jewelry	4%	20%*	20%

* Lower platform commission rates for smaller-sized purchases (i.e., higher effective affiliate commission rates for smaller-sized purchases).

Amazon affiliate commission rates

- Effective commission rates are particularly important for Amazon because nearly 2/3 (63%) of Amazon's sales are third-party sales

Category	Affiliate commission rate	Amazon commission rate	Effective affiliate commission rate out of Amazon commission
Gift cards, wireless service plans, alcoholic beverages, digital Kindle products purchased as a subscription, food prepared and delivered from a restaurant, Amazon Appstore, Prime Now, Amazon Pay Places, or Prime Wardrobe purchases	0%	8%–20%	0%
Video games	1%	15%	6.7%
Video game consoles	1%	8%	12.5%
Televisions	2%	8%	25%
DVD and Blu-Ray	2.5%	15%	16.7%
PCs and PC components	2.5%	8%	31.3%
Amazon Fresh, toys	3%	15% (toys)	20%
Amazon Fire tablet devices, Amazon Kindle devices, Amazon Cloud Cam devices, Fire TV Edition smart TVs, Amazon Fire TV devices, Amazon Echo devices, Ring devices, luggage, shoes, and handbags & accessories	4%	15%	26.7%
Apparel	4%	17%	23.5%
Watches	4%	16%*	25%
Jewelry	4%	20%*	20%

* Higher platform commission rates for smaller-sized purchases (i.e., lower effective affiliate commission rates for smaller-sized purchases).

Amazon affiliate commission rates (2)

- Effective commission rates are particularly important for Amazon because nearly 2/3 (63%) of Amazon's sales are third-party sales

Category	Affiliate commission rate	Amazon commission rate	Effective affiliate commission rate out of Amazon commission
Physical books, health & personal care, sports, kitchen, automotive, baby products	4.5%	15%**	30%
Digital music, grocery, physical music, handmade, digital videos	5%	15%**	33.3%
Outdoors, tools	5.5%	15%	36.7%
Headphones, beauty, musical instruments	6%	15%	40%
Business & industrial supplies	6%	12%	50%
Furniture, home, home improvement, lawn & garden, pet products, pantry	8%	15%*	53.3%
Luxury beauty, Amazon Coins	10%	15%**	66.7%

** Lower platform commission rates for smaller-sized purchases (i.e., higher effective affiliate commission rates for smaller-sized purchases).

* Higher platform commission rates for smaller-sized purchases (i.e., lower effective affiliate commission rates for smaller-sized purchases).

eBay affiliate commission rates

Category	Affiliate commission rate	eBay commission rate *	Effective affiliate commission rate out of eBay commission	Affiliate commission cap
Real estate	1%	13.25%	7.5%	\$100
Electronics: Computers, tablets & networking	1.5%	13.25%	11.3%	\$550
Electronics: Cameras & photo, cell phones & accessories, TV, video & audio, video games & consoles	2%	13.25%	15.1%	\$550
Business & industrial	2.5%	13.25%	18.9%	\$225
Collectibles, home & garden, lifestyle (gift cards & coupons, sports, tickets & events), vehicle parts & accessories	3%	13.25%	22.6%	\$550
Musical instruments	3%	6.35%	47.2%	\$550
Media (books, comics & magazines, DVDs & movies, music)	3%	14.95%	20.1%	\$550
eBay Motors	4%	13.25%	30.2%	\$100
Fashion	4%	13.25%	30.2%	\$550
All other	4%	13.25%	30.2%	\$550

* Lower eBay commission rates for larger-sized purchases (i.e., higher effective affiliate commission rates for larger-sized purchases).